

ROYAL BOTANIC GARDENS, KEW.

# BULLETIN

## OF

# MISCELLANEOUS INFORMATION.

No. 9]

[1921

### XLI. ALPHABETICAL LIST OF NOMINA CONSERVANDA

(Phanerogamae).

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During the course of investigations preparatory to the International Botanical Congress of Vienna (1905) it was found that the strict application of the principle of priority of publication to genera would entail the replacement of several hundred well-known generic names by little known ones. It was felt that the practical disadvantages of such a course were so great that it was desirable to adopt some means of preserving the names in question, and a list of NOMINA CONSERVANDA was accordingly drawn up. This consisted of generic names which should be retained in any case, the operation of the Rules of Nomenclature being suspended in so far as they required the rejection of any name included in the list.

A summary of the discussion which took place on this question at the Vienna Congress may be found in *Actes Congr. Bot. Vienne, 1905*, pp. 98-101. The Article providing for a list of nomina conservanda was passed by 133 votes against 36, a majority of four to one.\*

A first list of Nomina Conservanda was appended to the International Rules adopted by the Vienna Congress.† This included 405 generic names of *Phanerogamae*. A second list was added in 1910.‡ This included 15 genera of *Chlorophyceae*, 17 *Phaeophyceae*, 23 *Rhodophyceae*, 1 Pteridophyte (*Selaginella*), and 53 additional *Phanerogamae*.

The phanerogamic genera were arranged in accordance with *Dalle Torre et Harms, Genera Siphonogamarum*, and were combined in one list in the second edition of the International Rules.§

\* *Actes. Congr. Bot. Vienne*, 101 (1906).

† *I.e.* 234.

‡ *Vide Actes. Congr. Bot. Brux.*, i. pp. 108-116 (1912).

§ *Briquet, Règles Internat. Nomencl. Bot.*, ed. 2, p. 78 (1912).

It has been found in practice that a systematic method of arrangement of nomina conservanda is not very convenient for consultation, and that it has led to certain nomina conservanda being overlooked. Furthermore, the works in which these lists appeared are inaccessible to a large number of botanists. It accordingly seems desirable to publish a list of the Nomina Conservanda (*Phanerogamae*) in alphabetical order. It has not been thought necessary to include references: these may be found in the Index Kewensis, the Genera Siphonogamarum and the original lists.

In agreement with the typography used in the second edition of the International Rules the names of certain early authorities who did not adopt the binary system of nomenclature are cited in square brackets, e.g. *Canella* [P. Br.] Sw. (1791).

- Acronychia*, Forst. (1776).  
*Actinomeris*, Nutt. (1818).  
*Adenandra*, Willd. (1809).  
*Adesmia*, DC. (1825).  
*Adlumia*, Rafin. (1808).  
*Aechmea*, Ruiz et Pav. (1794).  
*Aegle*, Correa (1800).  
*Aerva*, Forsk. (1775).  
*Agapanthus*, L'Hérit. (1788).  
*Agathis*, Salisb. (1807).  
*Agathosma*, Willd. (1809).  
*Agonis*, Lindl. (1839).  
*Ailanthus*, Desf. (1789).  
*Alangium*, Lam. (1783).  
*Allionia*, L. (1759); emend. Choisy (1849).  
*Alloplectus*, Mart. (1829).  
*Alysicarpus*, Neck. (1790).  
*Alyxia*, Banks ex R. Br. (1810).  
*Amaracus*, Gleditsch. (1764).  
*Amasonia*, L.f. (1781).  
*Amberboa*, Less. (1832).  
*Amianthium*, A. Gray (1837).  
*Amorphophallus*, Blume ex Decne. (1835).  
*Amphicarpaea*, Ell. (1818).  
*Amphérrox*, Spreng. (1827).  
*Amsinckia*, Lehm. (1831).  
*Anarrhinum*, Desf. (1800).  
*Ancistrocladus*, Wall. (1829).  
*Andira*, Lam. (1783).  
*Anisotes*, Nees (1847).  
*Antiaris*, Lesch. (1810).  
*Aquilaria*, Lam. (1786).  
*Arceuthobium*, Bieb. (1819).  
*Ardisia*, Sw. (1788).  
*Arenga*, Labill. (1803).  
*Argania*, Roem. et Schult. (1819).  
*Argyrolobium*, Eckl. et Zeyh. (1836).  
*Artanema*, D. Don (1835).  
*Ascolepis*, Nees ex Steud. (1855).  
*Aspidosperma*, Mart. et Zucc. (1824).  
*Astelia*, Banks et Sol. ex R. Br. (1810).  
*Atlantia*, Correa (1805).  
*Athenaea*, Sendtn. (1846).  
*Bacopa*, Aubl. (1775).  
*Balanites*, Delile (1813).  
*Barosma*, Willd. (1809).  
*Barringtonia*, Forst. (1776).  
*Belamcanda*, Adans. (1763).  
*Belmontia*, E. Mey. (1837).  
*Berkheya*, Ehrh. (1788).  
*Berrya*, Roxb. (1814).  
*Biarum*, Schott (1832).  
*Bifora*, Hoffm. (1816).  
*Bikkia*, Reinw. (1826).  
*Blumea*, DC. (1833).  
*Bobartia*, Salisb. (1812).  
*Borreria*, G. F. W. Mey. (1818).  
*Bouchea*, Cham. (1832).  
*Brickellia*, Ell. (1824).  
*Brodiaea*, Smith (1811).  
*Brosimum*, Sw. (1788).  
*Brownea*, Jacq. (1760).  
*Brucea*, J. F. Mill. (1780).  
*Buchloë*, Engelm. (1859).  
*Buckleya*, Torr. (1843).  
*Bulbine*, Willd. (1809).  
*Bulbophyllum*, Thou. (1822).  
*Bumelia*, Sw. (1788).  
*Bursera*, Jacq. ex L. (1762).  
*Butea*, Koenig ex Roxb. (1795).  
*Cajanus*, DC. (1813).  
*Calandrinia*, H. B. K. (1823).  
*Calanthe*, R. Br. (1821).  
*Calliandra*, Benth. (1840).  
*Callistephus*, Cass. (1825).  
*Calodendrum*, Thunb. (1782).  
*Calopogon*, R. Br. (1813).  
*Calycanthus*, L. (1759).  
*Calyptranthes*, Sw. (1788).  
*Calystegia*, R. Br. (1810).  
*Camassia*, Lindl. (1832).

- Canavalia*, DC. (1825).  
*Canella*, [P. Br.] Sw. (1791).  
*Cansjera*, Juss. (1789).  
*Capsella*, Medik. (1792).  
*Carallia*, Roxb. ex R. Br. (1814).  
*Careya*, Roxb. (1814).  
*Carissa*, L. (1767).  
*Carya*, Nutt. (1818).  
*Cavendishia*, Lindl. (1836).  
*Cayaponia*, Silva Manso (1836 vel 1837?).  
*Cayusea*, A. St.-Hil. (1837).  
*Cecropia*, L. (1758).  
*Centrosema*, Benth. (1838).  
*Cephaelis*, Sw. (1788).  
*Chaenostoma*, Benth. (1835).  
*Chamaedorea*, Willd. (1806).  
*Chamissoa*, H. B. K. (1817).  
*Chaptalia*, Vent. (1800).  
*Chlorogalum*, Kunth (1843).  
*Chonemorpha*, G. Don (1838).  
*Chrozophora*, Neck. (1790).  
*Chrysopsis*, Ell. (1824).  
*Clianthus*, Banks et Sol. ex G. Don (1832).  
*Cnicus*, Gaertn. (1791).  
*Coccocypselum*, Schreb. (1791).  
*Cocculus*, DC. (1818).  
*Cochlospermum*, Kunth. (1822).  
*Codiaeum*, Adr. Juss. (1824).  
*Cola*, Schott et Endl. (1832).  
*Colea*, Boj. (1837).  
*Coleanthus*, Seidl. (1817).  
*Colubrina*, Rich. ex Brongn. (1827).  
*Commiphora*, Jacq. (1797).  
*Copaifera*, L. (1762).  
*Cordylanthus*, Nutt. ex Benth. (1846).  
*Cordyline*, Comm. ex Juss. (1789).  
*Corydalis*, Medik. (1789).  
*Corynephorus*, Beauv. (1812).  
*Crudia*, Schreb. (1789).  
*Crypsis*, Ait. (1789).  
*Cryptotaenia*, DC. (1829).  
*Ctenium*, Panz. (1814).  
*Cunninghamia*, R. Br. (1826).  
*Cyanotis*, D. Don (1825).  
*Cybianthus*, Mart. (1829).  
*Cymodocea*, C. Koenig (1805).  
*Cynodon*, Rich. (1805).  
*Cytinus*, L. (1764).  
  
*Daboecia*, D. Don (1834).  
*Dalbergia*, L.f. (1781).  
*Dendrobium*, Sw. (1799).  
*Derris*, Lour. (1790).  
*Descourainia*, Webb et Berth. (1836-50).  
*Desmanthus*, Willd. (1806).  
*Desmodium*, Desv. (1813).  
*Desmoncus*, Mart. (1824).  
  
*Diarrhena*, Beauv. (1812).  
*Dicentra*, Bernh. (1833).  
*Dichorisandra*, Mikan (1820).  
*Dicliptera*, Juss. (1807).  
*Dictyoloma*, Adr. Juss. (1825).  
*Didymocarpus*, Wall. (1819).  
*Dipteryx*, Schreb. (1791).  
*Disparago*, Gaertn. (1791).  
*Dissotis*, Benth. (1849).  
*Dombeya*, Cav. (1786).  
*Downingia*, Torr. (1856).  
*Dryandra*, R. Br. (1810).  
*Duguetia*, A. St.-Hil. (1825).  
*Duroia*, L.f. (1781).  
  
*Echallium*, A. Rich. (1824).  
*Echinaria*, Desf. (1798-1800).  
*Echinocystis*, Torr. et Gray (1840).  
*Eclipta*, L. (1771).  
*Ehrharta*, Thunb. (1779).  
*Eichhornia*, Kunth (1843).  
*Eleutherine*, Herb. (1843).  
*Ellisia*, L. (1763).  
*Elytraria*, Rich. (1803).  
*Embelia*, Burm. f. (1768).  
*Emex*, Neck. (1790).  
*Enicostemma*, Blume (1826).  
*Entada*, Adans. (1763).  
*Epiphegus*, Nutt. (Maio 1818).  
*Eranthis*, Salisb. (1807).  
*Eria*, Lindl. (Aug. 1825).  
*Erophila*, DC. (1821).  
*Euclidium*, R. Br. (1812).  
*Eucomis*, L'Hérit. (1788).  
*Eulophia*, R. Br. (1823).  
*Eusideroxylon*, Teysm. et Binn. (1863).  
*Exocarpum*, Labill. (1798).  
*Eysenhardtia*, H. B. K. (1824).  
  
*Fagopyrum*, Moench (1794).  
*Falcaria*, Host (1827).  
*Fedia*, Moench (1794).  
*Felicia*, Cass. (1818).  
*Ficinia*, Schrad. (1832).  
*Fimbristylis*, Vahl (1806).  
*Franseria*, Cav. (1793).  
  
*Galactites*, Moench. (1794).  
*Gaylussacia*, H. B. K. (1819).  
*Gazania*, Gaertn. (1791).  
*Gerbera*, Cass. (1817).  
*Glossostigma*, Wight et Arn. (1836).  
*Glyceria*, R. Br. (1810).  
*Gordonia*, Ellis (1770).  
*Guatteria*, Ruiz et Pav. (1794).  
*Guizotia*, Cass. (1827).  
*Gustavia*, L. (1775).  
*Gynandropsis*, DC. (1824).  
*Gynura*, Cass. (1825).



- Halenia*, Borkh (1796).  
*Haplopappus*, Cass. (1828).  
*Haworthia*, Duval (1809).  
*Hebecladus*, Miens (1845).  
*Heberdenia*, Banks ex A.DC. (1841).  
*Helicodicerus*, Schott (1853).  
*Heliconia*, L. (1771).  
*Helinus*, E. Mey. ex Endl. (1840).  
*Helosis*, Rich. (1822).  
*Hesperochiron*, S. Wats. (1871).  
*Heteranthera*, Ruiz et Pav. (1794).  
*Heterolepis*, Cass. (1820).  
*Hierochloë*, R. Br. (1810).  
*Holigarna*, Buch.-Ham. ex Roxb. (1814).  
*Holodiscus*, Maxim. (1879).  
*Hosta*, Tratt. (1812).  
*Humboldtia*, Vahl (1794).  
*Hybanthus*, Jacq. (1760).  
*Hydrolea*, L. (1763).  
*Hymenocarpus*, Savi (1798).  
*Hypodiscus*, Nees (1836).  
*Hypolaena*, R. Br. (1810).  
*Hyptis*, Jacq. (1786).  
  
*Ichnocarpus*, R. Br. (1809).  
*Iochroma*, Benth. (1845).  
*Iresine*, [P.Br.] L. (1759).  
*Isopogon*, R. Br. ex Knight (1809).  
  
*Jacobinia*, Moric. (1846).  
*Jambosa*, DC. (1828).  
*Julocroton*, Mart. (1837).  
  
*Kennedya*, Vent. (1804).  
*Knightia*, R. Br. (1810).  
*Krigia*, Schreb. (1791).  
*Kundmannia*, Scop. (1777).  
  
*Lachnanthes*, Ell. (1816).  
*Laetia*, Loeff. (1758).  
*Lagascea*, Cav. (1803).  
*Lamarckia*, Moench. (1794).  
*Landolphia*, Beauv. (1806).  
*Lannea*, A. Rich. (1832).  
*Laportea*, Gaudich. (1826).  
*Laurelia*, Juss. (1809).  
*Lebetanthus*, Endl. (1841).  
*Leersia*, Sw. (1788).  
*Leucadendron*, Berg. emend. R. Br. (1810).  
*Leucospermum*, R. Br. (1810).  
*Liatris*, Schreb. (1791).  
*Libertia*, Spreng. (1825).  
*Limnophila*, R. Br. (1810).  
*Linociera*, Sw. (1791).  
*Liparis*, Rich. (1818).  
*Lipocarpha*, R. Br. (1818).  
*Listera*, R. Br. (1813).  
*Litsea*, Lam. (1789).  
*Lobularia*, Desv. (1814).  
  
*Logania*, R. Br. (1810).  
*Loiseleuria*, Desv. (1840).  
*Lomatia*, R. Br. (1810).  
*Lonchocarpus*, H. B. K. (1824).  
*Lonchostoma*, Wikstr. (1818).  
*Lucya*, DC. (1830).  
*Luzula*, DC. (1805).  
*Luzuriaga*, Ruiz et Pav. (1802).  
*Lyginia*, R. Br. (1810).  
  
*Maclura*, Nutt. (1818).  
*Macrolobium*, Schreb. (1789).  
*Mahonia*, Nutt. (1818).  
*Maianthemum*, Web. (1780).  
*Majorana*, Boehm. (1760).  
*Malcolmia*, R. Br. (1812).  
*Malvastrum*, A. Gray (1849).  
*Mamillaria*, Haw. (1812).  
*Manettia*, Mutis ex L. (1771).  
*Mamulea*, L. (1767).  
*Melaleuca*, L. (1767).  
*Mertensia*, Roth (1797).  
*Metrosideros*, Banks ex Gaertn. (1788).  
*Miconia*, Ruiz et Pav. (1794).  
*Micranthemum*, Rich. (1803).  
*Mikania*, Willd. (1803-4).  
*Mitragyna*, Korth. (1839).  
*Monochaetum*, Naud. (1845).  
*Mucuna*, Adans. (1763).  
*Muellera*, L.f. (1781).  
*Murraya*, Koenig ex L. (1771).  
*Myristica*, Rottb. (1778).  
*Myroxylon*, L.f. (1781).  
  
*Naregamia*, Wight et Arn. (1834).  
*Nartheceum*, Juss. (1789).  
*Nasturtium*, R. Br. (1812).  
*Nemopanthus*, Rafin. (1819).  
*Neottia*, Sw. (1800).  
*Nerine*, Herb. (1820).  
*Nertera*, Banks et Sol. ex Gaertn. (1788).  
*Nervilia*, Comm. ex Gaudich. (1826).  
*Nicandra*, Adans. (1763).  
*Nothopegia*, Blume (1850).  
*Nothoscordum*, Kunth (1843).  
  
*Oberonia*, Lindl. (1830).  
*Oeonia*, Lindl. (1824).  
*Oligomeris*, Cambess. (1841-44).  
*Omphalea*, L. (1759).  
*Orinocarpum*, Beauv. (1804).  
*Ormosia*, Jack (1811).  
*Orphium*, E. Mey. (1837).  
*Ouratea*, Aubl. (1775).  
*Oxylobium*, Andrews (1809).  
*Oxypetalum*, R. Br. (1809).  
*Oxytropis*, DC. (1802).

- Pachyrrhizus*, Rich. ex DC. (1825).  
*Paederia*, L. (1767).  
*Paepalanthus*, Mart. (1835).  
*Pallenis*, Cass. (1822).  
*Parthenocissus*, Planch. (1887).  
*Patersonia*, R. Br. (1810).  
*Patinia*, Juss. (1807).  
*Pavonia*, Cav. (1786).  
*Peltophorum*, Walp. (1842).  
*Persea*, Gaertn. f. (1805).  
*Persoonia*, Sm. (1798).  
*Petalostemon*, Michx. (1803).  
*Phaulopsis*, Willd. (1800).  
*Philodendron*, Schott (1829).  
*Phrynium*, Willd. (1797).  
*Phyllocladus*, Rich. (1826).  
*Physocarpus*, Maxim. (1879).  
*Picramnia*, Sw. (1788).  
*Pilea*, Lindl. (1821).  
*Pimelea*, Banks et Sol. ex Gaertn. (1788).  
*Piscidia*, L. (1759).  
*Pitcairnia*, L'Hérit. (1789).  
*Pithecolobium*, Mart. (1837).  
*Platanthera*, Rich. (1818).  
*Platylepis*, A. Rich. (1828).  
*Plectranthus*, L'Hérit. (1785).  
*Podalyria*, Lam. (1793).  
*Podocarpus*, L'Hérit. ex Pers. (1807).  
*Podolepis*, Labill. (1806).  
*Polycarpaea*, Lam. (1792).  
*Polypompholyx*, Lehm. (1844).  
*Polystachya*, Hook. (1825).  
*Pongamia*, Vent. (1803).  
*Printzia*, Cass. (1825).  
*Protea*, R. Br. (1810).  
*Protium*, Burm. f. (1768).  
*Psophocarpus*, Neck. (1790).  
*Psychotria*, L. (1759).  
*Pterolobium*, R. Br. (1814).  
*Pteronia*, L. (1763).  
*Pterospermum*, Schreb. (1791).  
*Pterostylis*, R. Br. (1810).  
*Pupalia*, Juss. (1803).  
*Pycnanthemum*, Rich. (1803).  
*Pyrenacantha*, Wight (1831).  
*Pyrrhopappus*, DC. (1838).  
*Saccolabium*, Blume (1825).  
*Samadera*, Gaertn. (1791).  
*Sansevieria*, Thunb. (1794).  
*Scaevola*, L. (1771).  
*Schaueria*, Nees (1838).  
*Schleichera*, Willd. (1805).  
*Schoenolirion*, Durand (1855).  
*Schoenoplectus*, Palla (1888).  
*Schotia*, Jacq. (1786).  
*Schradera*, Vahl (1796).  
*Scleropyrum*, Arn. (1838).  
*Scolopia*, Schreb. (1789).  
*Scutia*, Comm. ex Brongn. (1827).  
*Sechium*, [P. Br.] Juss. (1789).  
*Securigera*, DC. (1805).  
*Securinega*, Comm. ex Juss. (1789).  
*Sequoia*, Endl. (1847).  
*Sesbania*, Scop. (1777).  
*Seymeria*, Pursh. (1814).  
*Shepherdia*, Nutt. (1818).  
*Silybum*, Adans. (1763).  
*Simethis*, Kunth (1843).  
*Siphonochia*, Torr. et Gray (1838).  
*Skimmia*, Thunb. (1783).  
*Smilacina*, Desf. (1807).  
*Smithia*, Ait. (1789).  
*Sonerila*, Roxb. (1814).  
*Sonneratia*, L.f. (1781).  
*Sorbaria*, A. Br. (1864).  
*Sorocephalus*, R. Br. (1810).  
*Spathelia*, L. (1763).  
*Spergularia*, J. et C. Presl (1819).  
*Sphacele*, Benth. (1829).  
*Sphenoclea*, Gaertn. (1788).  
*Spiranthes*, Rich. (1818).  
*Stachytarpheta*, Vahl (1805).  
*Stelis*, Sw. (1799).  
*Stemodia*, L. (1759).  
*Stenocarpus*, R. Br. (1810).  
*Stephanomeria*, Nutt. (1841).  
*Steriphoma*, Spreng. (1827).  
*Stiffia*, Mikan (1820).  
*Struthiola*, L. (1767).  
*Suaeda*, Forsk. (1775).  
*Suksdorfia*, A. Gray (1880).  
*Swartzia*, Schreb. (1791).  
*Symplocarpus*, Salisb. ex Nutt. (1818).  
*Tacca*, Forst. (1776).  
*Tapeinochilus*, Miq. (1868).  
*Taraxacum*, Wiggers (1780).  
*Tectona*, L.f. (1781).  
*Telopea*, R. Br. (1810).  
*Tephrosia*, Pers. (1807).  
*Terminalia*, L. (1767).  
*Ternstroemia*, Mutis ex L.f. (1781).  
*Tetragonolobus*, Scop. (1772).  
*Thevetia*, Adans. (1763).  
*Thymelaea*, Endl. (1847).  
*Thysanotus*, R. Br. (1810).  
*Rehmannia*, Libosch. ex Fisch. et Mey. (1835).  
*Reineckea*, Kunth (1844).  
*Rhaphiolepis*, Lindl. (1820).  
*Rhipsalis*, Gaertn. (1788).  
*Rhodotheramnus*, Reichb. (1827).  
*Rhynchocorys*, Griseb. (1844).  
*Rhynchosia*, Lour. (1790).  
*Rhynchospora*, Vahl (1806).  
*Romulea*, Maratti (1772).  
*Rottboellia*, L.f. (1779).  
*Ryania*, Vahl (1796).

- Timonius*, DC. (1830).  
*Tinantia*, Scheidw. (1839).  
*Toddalia*, Juss. (2 serm. 1789).  
*Tolmiea*, Torr. et Gray (1840).  
*Tourettia*, Fougereux (1787).  
*Tragus*, [Hall] Scop. (1777).  
*Trichilia*, [P. Br.] L. (1759).  
*Trichodesme*, R. Br. (1810).  
*Tricyrtis*, Wall. (1826).  
*Trigonastrium*, Miq. (1860).  
*Trinia*, Hoffm. (1814).  
*Trophis*, [P. Br.] L. (1759).  
  
*Uncaria*, Schreb. (1789).  
*Urceolina*, Reichb. (1828).  
*Ursinia*, Gaertn. (1791).  
  
*Ventenata*, Koel. (1802).  
*Vernonia*, Schreb. (1791).  
*Verticordia*, DC. (1826).  
*Villarsia*, Vent. (1803).  
*Vismia*, Vand. (1788).  
*Vochysia*, Juss. (1789).  
*Vriesea*, Lindl. (1843).  
  
*Wahlenbergia* Sherad. (1814).  
*Wallenia*, Sw. (1788).  
*Watsonia*, Mill. (1759).  
*Weihea*, Spreng. (1825).  
*Weinmannia*, L. (1759).  
*Welwitschia*, Hook. f. (1862).  
*Wikstroemia*, Endl. (1833).  
*Wistaria*, Nutt. (1818).  
*Withania*, Pauquy (1824).  
  
*Xanthophyllum*, Roxb. (1814).  
*Xylopi*, L. (1759).  
*Xylosma*, Forst. f. (1786).  
  
*Zamia*, L. (1763).  
*Zantedeschia*, Spreng. (1826).  
*Zelkova*, Spach (1841).  
*Zeugites*, [P. Br.] Schreb. (1791).  
*Zinnia*, L. (1759).  
*Zoisia*, Willd. (1801).

## XLII.—THE PHYTOPATHOLOGICAL SERVICE IN THE NETHERLANDS AND ITS COLONIES.

J. C. TH. UPHOF.

During the last decade the Phytopathological Service of the Netherlands has developed extensively throughout the country, and its activities are very numerous. Though it belongs to a small nation, it is the outcome of much painstaking work, and will not be found in such a high degree of development in any other country.

Dutch scientists have long been engaged in investigations on plant diseases or pests, for instance Dr. Snellen van Vollenhoven (1843), and Dr. J. Wttwaal (1860); later came the very active and eminent plant pathologist, Prof. Dr. J. Ritzema Bos, who from 1869 to 1920 has been the chief leader in Holland from the standpoint of original research, plant disease control, lecturing and popularising the knowledge of plant pathology among the masses of agricultural and horticultural people.

In 1895 the Phytopathological Laboratory "Willie Commelin Scholten" in Amsterdam was established out of private funds, Ritzema Bos being appointed Director, as well as Professor of Plant Pathology at the University of Amsterdam. In his inaugural speech at the University, he pointed out that phytopathology should not be considered as a part of botany, but as an independent science.

The main object of the institution was to study plant diseases and give advice and demonstrations to growers. The results of



the investigations were published in the *Tijdschrift over Plantenziekten* (Journal for Plant Diseases), and other periodicals, and as *Memoirs*. The general interest taken in it is shown from the correspondence. In 1895, the first year, 376, in 1905, 1272, in 1911, about 4900, and in 1912, 6804 letters were sent out.

In 1891 Prof. Dr. Hugo de Vries, Prof. Dr. Ritzema Bos, Dr. H. W. Heinsius and Dr. H. T. Calkoen organised the Netherlands Phytopathological Society, and the above-mentioned *Tijdschrift voor Plantenziekten* became its leading paper.

In 1899 the actual Phytopathological Service was established, more particularly in consequence of some restrictions made by the United States of America as to San José Scale, peach yellows and rosette. These diseases were unknown in the Netherlands, but certificates were required from nurserymen that their exported stock was free from these diseases or pests and "any other dangerous insects or plant diseases that might be transferred on nursery stock to other nurseries or to the orchard." At that time only nurseries were inspected, and not the actual exported plants.

From 1899 until 1906 the Phytopathological Service was situated in Amsterdam. From 1906 until the present time the seat has been at Wageningen. Prof. J. Ritzema Bos remained Director, whereas Dr. Johanna Westerdijk, who is also Professor of Plant Pathology at the University of Utrecht, took charge of the institution "Willie Commelin Scholten" in Amsterdam as well. Quite recently the institution "Willie Commelin Scholten" was removed to Baarn.

An important advance was made in 1909, when the Phytopathological Service was divided into a general and a special branch. The former took charge of questions of control of plant diseases and pests, and stands in close connection with the Government Institution for Plant Pathology of the Agricultural College at Wageningen. The latter service took charge of nursery inspection and kindred activities.

At the present time the entire Phytopathological Service is independent of the Institution for Plant Pathology.

The present Phytopathological Service is extensive and employs a large staff of scientifically and technically trained men, as well as several persons employed in offices, museums, laboratories and experimental fields.

The Director of the Service is assisted by three phytopathologists, one ornithologist, two agricultural and horticultural experts, besides twenty-two technical officials and controllers; the latter residing in various parts of the Netherlands, especially in agricultural and horticultural centres such as Boskoop, Aalsmeer, Naarden, Oudenbosch, Naaldwijk, Lisse, Hoorn, Venlo, Elst and other places. A technical curator is employed in the museum.

In the administrative section seven persons are employed, while six take charge of laboratories and experimental fields.

Further, there are about 200 correspondents and collaborators distributed over the entire country; these men are usually educated in agricultural and horticultural schools or colleges, and have therefore a fundamental knowledge of plant diseases, pests, and their control.

The Phytopathological Service is divided into six chief sections, which are able to work more or less independently of each other.

i. *Section for examination of diseases and infected plants.* Information is given to agriculturists, horticulturists, foresters and amateurs who require advice as to the life-history of disease-causing fungi or animals and as to the methods for combating them. If necessary, inspections are made free of cost. The laboratories of this section are well equipped with modern apparatus for making pure cultures of fungi and raising various pests. Experimental fields and greenhouses have also been erected in order to carry out inoculation experiments. The investigations are carried on in a general manner; they are not conducted extensively nor purely scientifically, though enough is being done to provide for correct diagnoses of diseases and to recommend suitable remedies.

This division also sends, when necessary, contributions on diseases to various periodicals and newspapers. It issues warnings at various times when certain diseases may become prevalent. It distributes pamphlets, which treat in a popular way of diseases and pests of special interest and kindred subjects.

ii. The second section takes charge of methods of combating diseases and pests of horticultural crops, and forms a very important branch of the Phytopathological Service. Such a branch is especially necessary in a country like Holland, where horticulture is mainly developed in centres; where sometimes several hundred growers are near each other, such as Boskoop, Aalsmeer, Naaldwijk, and other places, where the growers have one common interest in their work. In such localities it is necessary to use every efficient method to combat disease. Further, inquiries are made as to the distribution and virulence of certain diseases. Lectures and field demonstrations are given whenever necessary, and short notices are sent to local newspapers. Personal visits are paid to nurserymen and other growers, where special advice is given as to problems of plant pathology or methods of combating diseases are demonstrated. The staff receives much co-operation from its many collaborators in this line of work. Publications of a somewhat technical nature for the horticulturist are abstracted and utilised as propaganda.

iii. The third section is interested in combating diseases and pests from an agricultural standpoint, and works upon the same principles as the former. It covers a much larger area, because at the present time agriculture is not as intensively centralised as horticulture. In this respect also collaborators are of great help, and are well acquainted with most diseases and pests of



farm crops. Lectures and demonstrations are usually given in winter, while in summer field demonstrations and excursions are held whenever they are wanted. Collaborators who render services do not receive any salary, though travelling and hotel expenses are refunded by the Government. Fields are carefully inspected and the question of selling seeds or using them as planting material decided. Great care is exercised in the inspection of potatoes. Much advantage is taken of technical publications dealing with agricultural crops.

iv. Another branch of work of much importance is the supervision of the laws relating to disease, which includes also the control of plants for export. In the former case measures have been prescribed against the wart disease of potatoes and American gooseberry mildew. The areas of land are carefully inspected and, in fields where wart disease is found, all plants are destroyed by boiling. The growing of potatoes in infested fields is prohibited, the growers receiving indemnification for any loss caused by this enforcement of the law.

As regards American gooseberry mildew the tops of the twigs of the current year are cut off and burnt, while the soil round the shrub is dug up for a few inches. The transport of gooseberries from infested orchards is also controlled.

The Phytopathological Service of the Netherlands was the first in any country to insist on the inspection of plants, or parts of plants, destined for export, in order to guarantee the absence of diseases or pests. Before packing, all plants are inspected by controllers, and a certificate is given for export in cases of freedom from disease. No permission is accorded to export infected goods, which is of considerable importance in preserving the reputation of Dutch growers abroad. This control on export existed in the Netherlands long before freedom from disease was required by any country as a necessary condition of import. Later on, rigid restrictions on the import of live plants, bulbs and potatoes were enforced by various Governments, *e.g.*, the United States of America, New Zealand, South Africa, and Czecho-Slovakia. The propaganda which had long been actively carried on in Holland had already greatly contributed to the improvement in the health of plants, so that the task of the Governments in the enforcement of legislation was much facilitated.

v. The ornithological section, which is also of importance, studies the bird species which are useful or harmful to crops, their habits and time of breeding being observed all over the country.

vi. A very important section is that which takes charge of the sections of horticultural and agricultural shows relating to diseases and pests. In every part of Holland where such exhibitions take place, there are very neat-looking stands from the Phytopathological Service showing various stages in the development of diseases, preserved either in alcohol, formalin, as mounted

herbarium species, and the like. Further, there are statistical tables, descriptions of the life-history of fungi and insects and microscopical slides. Not only in the Netherlands, but also abroad, this division is very active. For example, the author noticed at the Lille Exhibition, in the department of Dutch exhibitors, a large stand on plant diseases which was sent by the Phytopathological Service of Wageningen.

Much work is done in organising Phytopathological Research in the Dutch possessions, especially the Dutch East Indies, though a Phytopathological Service such as exists in Holland has not yet been established.

The Department of Agriculture has in Java a Laboratory for Plant Diseases where a staff of botanists and zoologists are already engaged upon various lines of research, while several private companies have also engaged botanists or trained phytopathologists to study various pests and diseases and to find means of eradicating them; such stations have been established in Malang and Deli, and the Java Sugar industry possesses one.

No doubt in the near future the Dutch East and West Indies will also have a very extensive Phytopathological Service, as well organised as other institutes for tropical agriculture already formed.

## XLIII.—THE YELLOW PINES OF NORTH AMERICA.

W. DALLIMORE.

In Canada and the United States there are several groups of species of *Pinus* that bear similar common names, one of the most important being designated "yellow pine." The yellow pines include species that are very different in general appearance and in working qualities, whilst they are as widely separated geographically as it is possible for them to be. From these facts it is desirable that persons handling the timber should have an intimate knowledge of the several species, and of their distribution.

The yellow pines include the following species:—

<i>P. cubensis</i> , Grisebach.	<i>P. ponderosa</i> , Douglas.
<i>P. mitis</i> , Michaux.	<i>P. Strobus</i> , Linnaeus.
<i>P. monticola</i> , Douglas.	<i>P. Taeda</i> , Linnaeus.
<i>P. palustris</i> , Miller.	<i>P. virginiana</i> , Miller.

As all are known by several common names in addition to that of yellow pine, the various synonyms are given with each species.

***P. cubensis*, Grisebach.**—Bastard Pine, Cuban Pine, Meadow Pine, Pitch Pine, She Pine, She Pitch Pine, Slash Pine, Spruce Pine, Swamp Pine, Yellow Pine.

This is the most tropical of the Eastern N. American species. Its northern limit is reached in S. Carolina, and it is found in Georgia, Southern Alabama, Louisiana and Florida, extending



thence to the Bahamas, Honduras, and Guatemala. Mature trees range up to 150 ft. in height, with a diameter of 3 ft., and often a clear trunk of 50–60 ft. The leaves may be in pairs or in clusters of three. They average 9 ins. in length, are deep green in colour, and have finely-toothed margins, and short, horny points. The cones resemble those of the European *P. Pinaster* in shape and colour, and are 4–5 in. long by 2–2½ in. in width. The timber is heavy, about 39 lbs. per cubic foot, strong, rather coarse-grained, resinous and of good quality. It most closely approaches that of *P. palustris* in character, and can be used for similar purposes, in fact it is often marketed with the wood of that tree and is very similar in strength. Resin is sometimes obtained from standing trees by tapping, whilst tar, turpentine and other products are procured by destructive distillation of the wood. The resin is said to yield more turpentine than that of *P. palustris*.

***P. mitis*, Michaux** (*P. echinata*, Miller).—Bull Pine, Carolina Pine, North Carolina Pine, North Carolina Yellow Pine, Oldfield Pine, Pitch Pine, Poor Pine, Short-leaf Pine, Short-leaved Yellow Pine, Shortschat Pine, Spruce Pine, Virginia Yellow Pine, Yellow Pine.

*P. mitis* and two other species, *P. palustris* and *P. Taeda*, are often referred to indiscriminately as yellow pine or eastern yellow pine, and their wood is often mixed when marketed, although the three trees are perfectly distinct in growth, foliage and cones. Moreover, the wood of *P. palustris* at its best is much superior to that of the better grades of lumber of the other two. Microscopically, however, the structure of the three species is so similar that it is practically impossible to separate one from the other. *P. mitis* is often distinguished as “short-leaf pine” or “short-leaved yellow pine.” It is widely distributed in Eastern N. America and covers many hundreds of square miles from New York to N. Florida and from the Atlantic to Arkansas and Texas. It varies in height from 80–120 ft., and in diameter from 1½–2 ft. The young shoots are distinct by reason of their violet markings and glaucous bloom, whilst the slender, flexible, slightly-twisted leaves are 3–5 in. long, and produced in pairs or occasionally in threes. The cones are usually clustered, ovate, and 1½–2 in. long, each scale being terminated by a short prickle which is usually deciduous before the fall of the cones. *P. mitis* is an important timber tree, the wood being of good quality with orange or yellowish-brown heartwood and creamy-yellow sapwood. It is less resinous and more easily worked than that of *P. palustris*, and is employed for the lighter kinds of building construction, the indoor finish of houses, panelling, car-building, furniture, railway sleepers, and for all other purposes for which good pine wood can be utilised. As is the case with many other trees from Eastern N. America it does not thrive in the British Isles, although small specimens are sometimes seen.

**P. monticola**, *Douglas*.—Finger-cone Pine, Idaho White Pine, Little Sugar Pine, Mountain Pine, Mountain White Pine, Short-leaved Weymouth Pine, Silver Pine, Soft Pine, Sugar Pine, White Pine, Yellow Pine.

A tree attaining in America a height of 80–175 ft. with a trunk 15–25 ft. in girth. The young shoots are clothed with minute reddish down and by this character the species may be distinguished from its near ally *P. Strobus*, for, when down is present on the young shoots of the latter species it is confined to small patches at the base of leaf clusters. The leaves are in fives, glaucous-green, dense on the branchlets and rarely more than 4 in. long. The cones resemble those of *P. Strobus*, but are composed of a larger number of scales. There is little difference between the wood of this species and of *P. Strobus*, and both can be used for the same purposes (see *P. Strobus*). *P. monticola* is found in the Pacific Coast region, extending from the southern part of British Columbia to the western slopes of the Rocky Mountains in Northern Montana, the coast region of Washington and Oregon and the Cascades and Sierra Nevada ranges in California. In its more southern localities it attains an altitude of 10,000 ft.

**P. palustris**, *Miller*.—Broom Pine, Fat Pine, Florida Pine, Florida Long-leaf Pine, Florida Yellow Pine, Georgia Pine, Georgia Heart Pine, Georgia Long-leaf Pine, Georgia Pitch Pine, Heart Pine, Long-leaf Pitch Pine, Longstraw Pine, Rosemary Pine, Southern Hard Pine, Southern Heart Pine, Southern Pitch Pine, Southern Yellow Pine, Texas Long-leaf Pine, Texas Yellow Pine, Turpentine Pine, Yellow Pine.

In the British Isles this tree and its timber is usually known under the common name of Pitch Pine, but in America it is recognised as Long-leaf Pine, the term Pitch Pine being more general in connection with *P. rigida*. The species attains a height of 80–110 ft. and a girth of 9 ft., and the branches are often gnarled and twisted. The leaves are in threes, densely crowded on the branchlets, slender, flexible, up to 18 in. long on young vigorous trees and about 9 in. long on old specimens. The cones are cylindrical, 6–10 in. long and 2–3 in. wide, dull brown and usually leave a few scales attached to the branches when they fall. It forms pure forests many miles in width in the Atlantic and Gulf States from Virginia to Florida. The wood is hard, strong and resinous, and is usually regarded as the strongest and most durable of pine timbers. It is used extensively for heavy construction and all kinds of purposes where strength and durability are concerned. Large quantities of wood are used for naval architecture, school and church furniture, flooring, panelling, telegraph and telephone poles, &c. *P. palustris* is the most important resin-producing pine in N. America, and there is a considerable industry in tapping, and in the collection and distillation of the resin. There is also an industry connected with the leaves, for the fibre is



extracted and used for stuffing mattresses and pillows, and for weaving into a coarse kind of matting. The water required in the preparation of the fibre has been used afterwards for medicinal baths. By destructive distillation of the wood, pitch, tar, tar oils, and charcoal are obtained. Although introduced to the British Isles nearly 200 years ago few specimens are known to exist in this country, for it is not suited to our climate.

**P. ponderosa**, *Douglas*.—Big Pine, Ball Pine, Heavy Pine, Heavy-wooded Pine, Longleaf Pine, Pitch Pine, Western Yellow Pine, Yellow Pine.

In its widest sense and particularly from a commercial point of view, this species includes *P. arizonica*, Engelmann and *P. Jeffreyi*, Greville, for although often regarded as distinct species, the distinctions are geographical rather than botanical, and the timber is indistinguishable. *P. ponderosa* is a very variable species, ranging in its native localities from 60–230 ft. in height with a straight clean trunk up to 25 ft. in girth. The branches are usually stout, spreading, and often drooping. The leaves are in threes, lasting three years, densely crowded on the branchlets, rigid, curved, varying on different trees from 3–10 in. in length, the longer ones having a basal sheath nearly an inch long. The cones also vary greatly. They may be solitary or in clusters, and from 3–8 in. long and 3–4½ in. wide before opening. When they fall from the tree a few basal scales are usually left on the branches. The wood is hard, strong, resinous, close-grained and easy to work. It is obtainable in large dimensions and is used for heavy construction, the indoor finish of houses, joists, cupboards, doors, flooring, general carpentry, boxes, fencing, railway sleepers, pit props and fuel. If used in contact with the soil it must be treated with a preservative. Resin can be obtained from the trunk by the usual methods of extraction and in Oregon, fibre extracted from the leaves is used for stuffing medicated pillows, mattresses, &c. A turpentine oil and a snuff-like powder obtained during the preparation of the fibre are used in medicine in the treatment of bronchial and catarrhal complaints.\* *P. ponderosa* is very widely distributed in Western N. America from the interior of British Columbia, southwards to Mexico and eastwards to N. Nebraska, the foot hills of the Rocky Mountains of Colorado and Western Texas. *P. ponderosa* thrives in the British Isles.

**P. Strobus**, *Linnaeus*.—Apple Pine, New England Pine, Northern Pine, Pumpkin Pine, Quebec Pine, Sapling Pine, Soft Pine, Tonawada Pine, Weymouth Pine, White Pine, Yellow Pine.

This is the most important pine of Canada and the Northern United States, but the timber is becoming scarce. It usually attains a height of 80–150 ft. with a tapering trunk 9–12 ft. in girth. The bark is smooth and thin except at the base of old

\* Diplomatic and Consular Reports, No. 2666, 1900, p. 23.

trees, where it may be 1-2 in. thick. The leaves are in fives, 3-5 in. long, slender and glaucous-green, the basal sheath falling early. The cones are cylindrical, pendulous, and borne near the points of the shoots. They are 4-6 in. long, about 1 in. in diameter and very resinous. The northern range of *P. Strobus* extends from Newfoundland to Manitoba, and it occurs throughout the Northern States from Minnesota to the Atlantic and South to Pennsylvania and to Northern Georgia. The wood is light, about 24 lbs. to the cubic foot when dry, the heartwood pinkish or light red and the sapwood pale yellow. It is straight-grained, compact, soft, easily worked, finishes well, with a fine, even surface, shrinks very little after seasoning and takes paint and polish well. In large trees the timber is singularly free from knots. It is used for general joinery, particularly the indoor finish of houses, doors, window-sashes, cupboards, joists, flooring, pattern-making for foundry work, veneered cabinets, boxes, matches, also in shipbuilding for spars and masts, and for paper pulp. The ease with which it can be worked and its freedom from serious shrinkage makes it very popular with the artisan. Timber of very good quality has been grown in the British Isles, but the species is liable to attack by several diseases, fungus and insect, hence it is not planted in quantity in this country.

***Pinus Taeda*, Linnaeus.**—Bastard Pine, Black Pine, Black Slash Pine, Bull Pine, Cornstalk Pine, Foxtail Pine, Frankincense Pine, Indian Pine, Loblolly Pine, Longschap Pine, Longshucks Pine, Longstraw Pine, Meadow Pine, North Carolina Pine, Oldfield Pine, Sap Pine, Shortleaf Pine, Slash Pine, Spruce Pine, Swamp Pine, Torch Pine, Virginia Pine, Yellow Pine.

Of the many common names applied to this tree, that of Loblolly pine is the most familiar, and it is under this name that the timber should be marketed. A native of the southern and s.-eastern parts of the United States, where it is distributed from Southern New Jersey to Southern Arkansas, Oklahoma, Eastern Texas and South-western Tennessee, it forms a tree 90-110 ft. high with a girth of 6-8 ft. The leaves are in threes, lasting 3-4 years, rigid, slightly twisted, and 6-9 in. long. The cones are ovoid-oblong, 3-5 in. long, and each scale is ended by a spine. The timber is often mixed with that of other species and sold as yellow pine. It is, however, inferior to that of *P. palustris* and *P. mitis*, although quite useful for many purposes. When creosoted it is very widely used for railway sleepers. It is also useful for general carpentry, shipbuilding, box boards and many other purposes. *P. Taeda* thrives on wet ground, and is one of the first species to become established on marshy land once the soil rises above the water level. It covers very large areas, and is said to be spreading, hence it is likely to become even more important as a timber producing species, than at present. In this country it gives poor results even as a garden tree, and although introduced in 1741 no large specimens are known.



**P. virginiana**, *Miller*.—Bastard Pine, Cedar Pine, Jack Pine, Jersey Pine, New Jersey Pine, Nigger Pine, Oldfield Pine, Poor Pine, Poverty Pine, River Pine, Scrub Pine, Second-growth Pine, Short Pine, Short-leaved Pine, Shortschat Pine, Shortschucks, Spruce Pine, Yellow Pine.

A tree usually 30–50 ft. high with a short trunk 12–18 in. in diameter, but occasionally over 100 ft. high, with a trunk 3 ft. through. The leaves are in pairs, rigid, twisted, and  $1\frac{1}{4}$ – $2\frac{1}{2}$  in. long. The cones are solitary or in pairs, usually midway along the season's growth, oblong or conical,  $1$ – $2\frac{1}{2}$  in. long and  $1$ – $1\frac{1}{2}$  in. wide when expanded, and each scale is terminated by a sharp prickle. It is widely distributed in Eastern N. America from New York to Northern Alabama and from the Atlantic Coast to Southern Alabama. The wood is light, soft and brittle, the orange or brownish heartwood being greatly in excess of the yellowish sapwood. Although often knotty and only suitable for fuel and inferior work, the best timber is used for log huts, railway sleepers, fencing, &c. It is not regarded as a very good sleeper wood, however, as under heavy traffic the securing spikes are easily loosened. It is also used for paper pulp, but is said to be more suitable for the chemical than the ground wood method of manufacture. The chief value of the species centres in its ability to establish itself on heavy, clayey land where other species do not thrive and little else will grow. In the British Isles its value is purely arboricultural.

#### XLIV.—NEW OR NOTEWORTHY SOUTH AFRICAN PLANTS,—IV,

J. BURTT-DAVY.

**41. *Flacourtia hirtiuscula***, *Oliv.*, Fl. Trop. Afr. i, 121 (1868).

SOUTH AFRICA. Transvaal: Waterberg Distr.; Warm Baths, Jan. and Apl. 1906, *Burt-Davy* 5282, and in *T.D.A. Herb.* 2159, 2326; *Bolus* 13694; Marico Distr., Wonderfontein, 1100 m. alt., *Burt-Davy* 7564.

TROPICAL AFRICA. Portuguese E. Africa: near Senna; Batoka Country, April 1860, *Dr. J. Kirk!* (*type*); between Tette and Kambassa, *Kirk!*; near Moramballa, *Kirk*; River Shire, *Kirk*; Chilabava, Lower Buzi River, 129 m., *Swynnerton* 1410. S. Rhodesia: The Matopos, *Burt-Davy* in *Trans. Dep. Agr. Herb.* 5018; Mazoe, 1450 m., *Eyles* 533!; Bulawayo, 900 m. *Rogers* 13701!. Nyasaland: Shire Highlands, *Buchanan* 255!

Native names: Mtawa (*Buchanan*), Iqoqoyo, with a Zulu click (*Swynnerton*).

The fruit is edible; Dr. Kirk noted on his labels "dark when ripe, eatable," and again "well-flavoured, eaten"; *Buchanan* notes that it is a "nice fruit."

This species is a shrub or small tree of the Upper Bush-veld in the practically frostless, summer-rainfall region with a low precipitation. It is worth experimental cultivation, with a view to the possible improvement of the fruit, in S. Africa and in Florida and Southern California.

An interesting addition to the South African flora.

**42. *Kiggelaria africana*, L., Sp. Pl. p. 1037 (1753); Harv., Fl. Cap. i, 71; *K. Dregeana*, Turcz. in Bull. Soc. Nat. Mosc. 27, ii, 333 (1854) !; *K. Dregeana*, var. *acuta*, Harv., Fl. Cap. i. 71 !**

**SOUTH AFRICA.** Cape Province: Cape Peninsula, and Divisions of George, Uitenhage (Zuurebergen *Drège* a, type of *K. Dregeana*, Turcz.), Umtata, Somerset East and Queenstown: Basutoland: Leribe, *Dieterlen* 180 !. Natal: near Enon, 900 m., *Wood* 1854 !; Alexandra Distr., Dumisa, *Rudatis* 390 !; without precise locality, *Gerrard* 1142 !; Inanda, *Wood* 1147 !. Orange Free State: Harrismith, shrub 4 ft., *Sankey* 244 !. Transvaal: Pretoria, Groenkloof, *Burtt-Davy* 18,805 !, 18,806 !, Zoutpansberg Distr., forest at Hangklip, circiter 1800 m. alt., *Legat* 76 ! Lydenburg Distr.: Sabie-hoek forest, common along streams 1200–1250 m., *Burtt-Davy* 1522 !, Burghers Pass up to 1500 m., *Burtt-Davy* 1557 ! Pilgrims Rest, 1650–1750 m., *Burtt-Davy* 1432 !; Pietersburg Distr., Houtboschberg, one of the most abundant trees in the lower forest (1300–1500 m. alt.) called “um-Pata” and “Spekhout”; probably gives its name to the forest known as the Pata(ta)bosch, near Haenertsburg.

Linnaeus gives “Æthiopia” as the habitat of this species, but cites the figure in Hort. Cliff. (t. 29) which, although inaccurate in some particulars, as noted by him, definitely associates the name with the South African tree. Thunberg includes the species in the *Prodromus Plantarum Capensium*, Part I, p. 81, 1794, and in the *Flora Capensis* (ed. Schultes, 1823) p. 395, and adds: “crescit prope Cap in fossa inter Tafelberg et Leuwekopp et juxta hortos. alibique vulgaris arbor.”

Timber pinkish grey, fairly close-grained, compact, neither a hard wood nor a soft wood; useful for boards, and used more or less for cabinet work and furniture, and fit for more general use. Continued immersion imparts a pink colour to the water, and the wood may have a dye value (*Dr. Sim*).

var. *obtusa*, *Burtt-Davy*, n. comb.; *K. Dregeana*, var. *obtusa*, Harv.; *K. integrifolia*, E. & Z.; non Jacq.

“Tree 8–10 ft.” Leaves elliptic-oblong, very obtuse (rarely some acute on the same branch) quite entire, minutely grey- or ferruginously-velutinous beneath.

**SOUTH AFRICA.** Cape Province: George, Uitenhage, Kaffraria, E. & Z., p. 15, No. 117 ! (types); Uitenhage, *Zeyher* s.n. !; Kaffraria, *Cooper* 281 !; 282 !; Grahamstown, *MacOwan* s.n. !; Kariëga Riv., *MacOwan* 634 !; Somerset East Div., Boschberg 900 m., *MacOwan* 634 !; bis; Cape Peninsula, Kloof over Roodebloem, *Wolley Dod* 2666 ! (pro parte). O. F. S. and Basutoland, *Cooper* 939 !. Transvaal: Heidelberg Distr., between



Waterval Riv. & Zuikerbosch, 1500 m. alt., *Schlechter* 3486! Witwatersrand, kopjes at Johannesburg, *Burt-Davy* 7501?. Records for Ermelo, Standerton and Heidelberg probably belong here.

*K. Dregeana*, Turcz. is based on Drège's 6722 from the Zuuerebergen, Uitenhage Div. and is described as "a *K. ferruginea*, E. & Z. quae plerumque foliis integerrimis etiam gaudet, distinguitur foliis basi alternatis, nec obtusis, pubescentia tenuissima albida nec rufa, glandulis a medio liberis, nec petalis ex toto adnatis." The character of the leaf-margin (serrate or entire) is unstable, both forms being found, not infrequently, on the same branchlet.

**43. *Kiggelaria ferruginea*, E. & Z., Enum. p. 15, 1835!**

Described as a shrub, 6-15 ft. high, and conspicuous by its dense rusty tomentum on both surfaces. Dr. Sim unites this with *K. africana*, L., but though forms of the latter sometimes show a rusty tomentum there are differences in the flowers which may give tangible differentiating characters on further study. I entirely agree with Sim, however, in uniting typical *K. Dregeana*, Turcz. with *K. africana*, L.

Ecklon & Zeyher attribute only 2 styles to this plant, but Harvey thought he detected the scars of five on old capsules; Pearson's 6367 from the Khamiesberg (one of the type localities), which is obviously the same form, shows five styles, as does Drège's specimen *d* from the Paarlberg, Paarl Div., which he labelled *K. africana*, L., perhaps on that account, though it matches the Namaqualand plant.

SOUTH AFRICA. Namaqualand: "Kamiesberge", *Zeyher*! in herb. Kew (part of type), *Pearson* 6367!; Orange River, E. & Z. 118, in herb. Kew (part of type)!, *Pearson & Pillans* 5867! 5911! Cape Prov.: Paarl Div., Paarlberg, *Drège* (pro parte); Beaufort West Div., Nieuweveldsbergen bei Beaufort, 900-1500 m. *Drège* e.

**44. *Pittosporum viridiflorum*, Sims, Bot. Mag. 41, t. 1684 (1814); *P. Kruegeri*, Engl. in Notizbl. Bot. Gart. Berlin ii. 26.**

A somewhat polymorphic species; the plant described as *P. Kruegeri*, Engl. has smaller flowers and shorter, rounder calyx-lobes than the typical form, but a study of the abundant material at Kew shows that intermediate forms occur and that the lobing of the calyx varies in flowers of the same inflorescence. There seems no valid reason therefore, for maintaining *P. Kruegeri*.

SOUTH AFRICA. Transvaal: Pretoria, colles supra Aapjes River, *Rehmann* 6513!, Groenkloof *Burt-Davy* 18807; Lydenburg Distr., Kluft bei Steph. Schoeman's Farm, *Wilms* 213 (type of *P. Kruegeri*, Engl.), Pilgrims Rest, *Burt-Davy* 1415; Zoutpansberg Distr., sides of hills bounding valley between Louis Trichard and Farm Geluk, 1000-1300 m. *Legat* 29 and 32; Barberton Distr., Barberton, *Burt-Davy* 5622; Pietersburg Distr., Magoobas Kloof, *Burt-Davy* 5190; Houtboschberg, *Burt-Davy* 5559; Rustenburg Distr., Magaliesberg along streams, *Pegler* 1031.

Swaziland: Forbes Reef, *Burt-Davy* 2746. Also in Natal, Basutoland, Transkei and the Eastern Cape, extending westwards along the mountains to the George Division.

Described from specimens communicated by Mr. Sweet, from Messrs. Malcolm and Sweet's nursery at Stockwell Common, grown from seed from the "Cape of Good Hope."

Cultivated in St. Helena and the Scilly Isles. In the N. Transvaal the natives consider the tree "good medicine."

**45. *Salix babylonica*, L. Sp. Pl. 1017 (1753).**

SOUTH AFRICA. Transvaal: a quick-growing tree, hardy and readily propagated from branch-cuttings and poles; therefore extensively planted round springs, dams and lakes and along spruits and streams.

Native of Central and South China, widely planted in Europe, whence cuttings were taken to St. Helena and South Africa. Only the pistillate tree is usually met with there or here, though a specimen bearing androgynous catkins (a hybrid?) has been collected in Bavaria (F. Schultz, herb. norm., Cent. 2, No. 1. in herb. Cantab.). Planted for shade and ornament. The wood is soft and is used for brake-blocks, mortars for stamping mielies, and for farm sleds. Foliage readily eaten by livestock; useful as greens for poultry if chopped up with their food. It is possible that in the long time which has elapsed since its introduction into South Africa, *S. babylonica* may have been pollinated by *S. capensis* or *S. gariepina*; intermediate forms should be looked for where any two of the three species occur together.

**46. *Salix gariepina*, Burch., Travels i, p. 317, t. 6 (1822); Burt-Davy in Transv. Agric. Journ. iii, t. xii, f. 2. *S. capensis* var. *gariepina*, Anders. in part; *S. capensis*, Auct. non Thun.**

A tree 12 to 50 ft. high, with pendulous branchlets sometimes 2 ft. long, but not equalling in length those of *S. babylonica*, L. Leaves of vegetative shoots, 5-7 cm. long, 6-9 mm. broad.

SOUTH AFRICA. Transvaal, Orange River Colony and Cape Province: Riparian along the Vaal and Orange Rivers and their larger tributaries, from near Ermelo, Transvaal (1600 m. alt.) and Aliwal North, Cape Prov. (and probably higher up), to the lower reaches of the Orange River in Bushmanland (200 m. alt.) and Little Namaqualand. Has been confused with *S. capensis*, Thun. which has shorter and broader leaves (2.5-5.5 cm. long, 9-13 mm. broad) and is not known to occur in the Orange River drainage basin. Nor does *S. gariepina*, Burch. appear to cross the karroo, though it may follow the mountains from Aliwal North southward to Albany. A specimen (*S. capensis*?) at Kew, *Atherley* 109, is of uncertain origin as the label reads "Orange River, Albany," but it does not affect the point. Other incomplete material from the Eastern Province (Sunday's River, &c.) suggests that there may be an, as yet, undescribed species, in that part of the country.

Collectors of Willows should endeavour to obtain both flowering and barren shoots from the same tree. The confusion

between our species of *Salix* is partly due to the dimorphic character of the leaves, which appears to have been generally overlooked; the first spring leaves of axillary flowering shoots are usually entire, smaller, shorter and often relatively broader than those of the barren vegetative shoots, which are developed later.

**SOUTH AFRICA.** Cape Province: Prieska Div.; banks of the Orange River, *Burchell* 1637! (*type*); Philipstown Div. near Petrusville, *Burchell* 2669! (*co-type*); Aliwal North Div., banks of Orange River, 1311 m., *Drège* b! Griqualand West: Barkly Div., Fourteen Streams, *Burt-Davy*! Kimberley Div., Panfontein, on the Vaal River, *Burt-Davy* 9579!. Little Bushmanland: Ramans Drift, 200 m. alt., "tree 12-25 ft.", *Pearson* 3111!. Transvaal: Bloemhof Distr., near Bloemhof, 1250 m. alt., *Burt-Davy* 1503! near Christiana, 1250 m. *Burt-Davy* (fine trees, *see* plate in *T.A.J. l.c.*); Potchefstroom Distr. (?) Nelson 171!

The leaves of *S. gariiepina* are sometimes infested with the ornamental parasitic fungus *Melampsora mixta*. Wood soft, trunks easily hollowed out and used by natives for mortars for stamping mielies; also used for brake-blocks and sleds. *Burchell* records that the Hottentots made bowls and "jugs" of the wood, smearing them with fat to prevent cracking. The foliage is much browsed by live-stock in spring and early summer, before the grass is plentiful; even the dry, fallen leaves are licked up greedily in the autumn. The green leaves, chopped up, are excellent for poultry. Propagates readily from cuttings and poles.

Called 'Vaal Willow' and 'Wilde Wilge-boom'.

**47. *Salix Woodii*, Seem.** in Engl. Jahrb. 21, Beibl. 53, p. 53 (1896).

Shrub or small tree, up to 10 ft., riparian on the head-waters and tributaries of the Crocodile, Olifants, Komatie, 'mBulusi, and Tugela Rivers from 1250 m. down to 180 m. alt. Not known to cross the Witwatersrand, into the drainage basin of the Vaal River. *Cooper's* 3160, labelled "O.F.S.", is probably from the Natal side of the high mountains near Van Reenen's Pass, possibly from a stream flowing into the Tugela River, as otherwise the species does not appear to occur in the drainage basin of the Orange River; Mr. N. E. Brown (son-in-law of Mr. Cooper) tells me that in the Orange Free State, Mr. Cooper collected only round Harrismith and Nelson's Kop, in crossing from Basutoland to Natal, via Van Reenen's Pass.

**SOUTH AFRICA.** Natal: upper Tugela River; near Colenso, *Wood* 4970 (*type*); Transvaal: Pretoria Distr., Crocodile Riv.: Magaliesberg, *Burke* 330!, *Zeyher* 1352! *Burt-Davy* 189!, *Leendertz* 715; Pretoria, Wonderboompoort, *Rehmann* 4532!, *Derdepoort*, *Leendertz* 374!; Pietersburg Distr., Koedoes River, Houtbosch, *Rehmann* 6509!; Marico Distr., Wonderfontein 4, 1100 m. alt. *Burt-Davy* 7218, banks of Groot Marico Riv., *Burt-Davy* 1218; Rustenburg Dist., Hex River near Rustenburg,



*Nation* 302!; Barberton Distr., Komatie River at Komatiepoort, *Rogers in Trans. Mus. Herb.* 4759!; *Schlechter* 11847!. Swaziland: banks of the White 'mBulusi River, *Burt-Davy*, 10614?. Imperfect specimens from Witpoortje, Witwatersrand, and Six-mile Spruit, Pa., labelled *S. Wilmsii* probably belong here, but better material is required for precise determination.

TROPICAL AFRICA. S. Rhodesia: Umtali Div.; Odzani Riv. Valley, *Teague* 125, may belong here, as may also *Munro* 2053 in *herb. Mus. Brit.*, (Victoria) and *Gibbs* 21 (Matopos), but better material is required.

Natal Willow.

**48. *Salix Wilmsii*, Seem.** in Engl. Jahrb. 27, Beibl. 64, p. 9 (1900).

Shrub or small tree up to 10 ft., riparian on the Komatie and Olifants Rivers and their tributaries, almost entirely on the eastern slope of the Drakensberg from about 1500 m. down to 180 m. alt., and apparently endemic to the Transvaal.

SOUTH AFRICA. Transvaal: Lydenburg Distr.; Spekboom River, *Wilms* 1350!, 1351 and 1352 (*types*); *Schlechter* 3938?.; Burghers Pass, up to about 1500 m. alt., *Burt-Davy* 1559!; between Pilgrim's Rest and Sabie, *Burt-Davy* 1584!; Pilgrims Rest, plentiful along the Blyde River, *Burt-Davy*!; Carolina Distr., Waterval Boven, *Rogers in Trans. Mus. Herb.* 12245!; Barberton Distr., Umlomati Valley, 1200 m. *Galpin* 1278!; Kaap Valley, near Clutha, *Thorncroft* 586!; Pietersburg Distr. near Haenertsburg, *Nelson* 424!, common along the Broedersstroom near Haenertsburg, 1906, *Burt-Davy* 5185; Zoutpansberg Distr., Spelonken, *Jenkins in Trans. Mus. Herb.* 8168;

This is quite distinct from *S. hirsuta*, Thun., a species belonging to the South-west Cape Region (Calvinia and Clanwilliam Divisions).

Low-veld Willow.

**49. *Populus canescens*, Sm.** Fl. Brit. iii. 1080.

Introduced from Europe and occasionally found as an escape from cultivation and established along streams and other wet places.

SOUTH AFRICA. Transvaal: Pretoria Distr.; Crocodile River, near the Magaliesberg, spontaneous along the river, 30 May, 1903, *Burt-Davy* 188; near Pretoria, *Burt-Davy*; Witwatersrand Distr., Roodepoort, spontaneous near the railway 26 March, 1904; Heidelberg Distr., Boschhoek, near Heidelberg, and Zuikerbosch River, near Balfour, in 1908; Standerton Distr., stream near Val Station, in 1908; Lydenburg Distr., near Lydenburg, *Burt-Davy*.

Wood white and light, used for making matches, brake-blocks, farm sledges, &c.; does not burn readily; said to be superior to that of *P. alba*. The poles are valued on farms for rafters and roof-poles for thatched houses, sheds, native huts, etc.; much grown around farm houses and by dams and streams for these purposes.

**50. *Stephania abyssinica* (Dill. & Rich.) Walp., *S. hernandifolia*, Auct. non Walp.**

SOUTH AFRICA. Pietersburg Distr.; Houtboschberg forests, Worsdell, Dec., 1909, in herb. Kew!; Modjadjies, Rogers 18044!. var. *tomentella* (Oliv.) Diels, *S. hernandifolia* var. *tomentella*, Oliv., and var. *pubescens*, Szyszyl.; *Homocnemia Meyeriana*, Miers; *Stephania Meyerivana*, Harv.

SOUTH AFRICA. Pondoland; on the Omsamwubo (St. John's) River, Drège (type of *Homocnemia Meyeriana*, Miers); St. John's, Pegler 1541!. E. Griqualand: Clydesdale, Tyson 2099!. Natal: Alexandra County, Dumisa, Rudatis 1408!; between Umzinto and Ifafa, Wood 3016!; Coldstream, Rehmann 6895!, without precise locality, Gerrard 1468, Cooper 904-12. Transvaal: Lydenburg Distr., near Lydenburg dorp, Wilms 7; Ermelo Distr., Mavrierstad, R. Pott 5105!. Swaziland: M'babane, 1500 m., Bolus 11679.

**51. *Antizoma angustifolia*, Miers ex Harv.** Fl. Cap. i, 13 (1859-60), *Cissampelos angustifolia*, Burchell, Travels, i. 389 (1822); *C. calcarifera*, Burch. op. cit. ii. 266 (1824); *Antizoma calcarifera*, Miers ex Harv. l.c.; *A. Burchelliana*, Miers l.c.

SOUTH AFRICA. Griqualand West: Herbert Div.; between Spuig-slangfontein and the Vaal Riv., Oct. 25, 1811, Burchell 1717, (type!); Lower Campbell, Nov. 16, 1811, Burchell 1795! (type of *C. calcarifera*, Burch.) 1795 bis (type of *A. Burchelliana*, Miers); St. Clair, K. Orpen 214!; Hay Div., between Klipfontein and Knegts Fontein, Burchell 2170!. British Bechuanaland: Maadji Mt., Burchell 2369!; Kuruman Div., between the sources of the Kuruman Riv. and Kosifontein, Burchell 2529!, plains south of Takun, Burchell 2229!. S. W. Protectorate: between Nauchas and Areb, in plains of granite sand, Pearson 9014!. Transvaal: Waterberg Distr., Klippan, Rehmann 5313 (a pubescent ♀ specimen, resembling *A. Harveyana*, Miers.).

The type specimen of *A. Burchelliana* does not agree with the description in the *Flora Capensis*, the spine being only 1-2 mm. long.

**52. *Antizoma Harveyana*, Miers, op. cit. p. 12.**

SOUTH AFRICA. Transvaal: Pretoria Distr.; Crocodile River, Magaliesberg, Nov. 1841, Burke s.n., (type!) in herb. Kew, Zeyher 9 in hbb. Kew and Camb.!, Aapjes-poort, Rehmann 4022!, Groenk'oof, Burt-Davy 18844!, Rooiplaat, Leendertz 785!; "Pretoria Distr.", Dr. Visser, T.M.H. 4694!; Waterberg Distr., Badsloop, 1400 m. Schlecht. 4282!. Orange Free State: Winburg Dist., Vet Riv., March 1841, Burke 448!; Boshof Distr., Smitskraal, Burt-Davy 10864. Natal: without precise locality, Gerrard 1180!

**53. *Cocculus hirsutus* (L.) Diels** in Engl. Pflanzenreich, 46 heft (iv. 94) p. 236 (1910); *C. villosus*, DC. Syst. I. p. 525.

SOUTH AFRICA. Transvaal: Pietersburg Distr.; Houtboschberg forests 1200-1700 m., June, 1906, Burt-Davy 2592!;

Macoutsie R., July, 1917, *Dr. Breyer in Transv. Mus. Herb. s. n.*; Zoutpansberg Distr., Kobbi, 900 m. *Schlecht.* 4623 !

**54. *Cissampelos mucronata*, A. Rich., Diels. op. cit.; C. Pareira, Dur. and Schinz, non L.**

SOUTH AFRICA. Transvaal: Barberton Distr.; twining amongst low bushes on river banks, Queen's River, *Galpin* 642 !, Kaap River, *Bolus* 7634. S. Rhodesia: "S. African Goldfields" Tati (?) 1870, *T. Baines in herb. Kew.*

Called "Msissi" in Zambesia.

**55. *Cissampelos torulosa*, E. Mey., Fl. Cap. I. p. 11 (1859-60). *Menispermum capense* Thun. Fl. Cap. p. 402 (1823), not *Cissampelos capensis* Thun. Prodr. p. 110 (1800).**

SOUTH AFRICA. Transvaal: Pietersburg Distr.; Houtbosch, *Rehmann* 5956 !, *Pott* 4756 !, Marouvonge Bush near Shilouvane, *Junod* 867 !; Lydenburg Distr., Pilgrims Rest, *Rogers* 14,748 in *Trans. Mus. Herb.*; Barberton Distr., *Pott* 5610 !. Cape Prov.: "in sylvis," without precise locality, *Thunb.* (type of *Menispermum capense*, Thun.); Knysna Div., "Koratra" (Karratera River) *Drège* a (type of *C. torulosa*). Natal.

**56. *Ranunculus pubescens*, Thun., Prodr. 94, 1800; Fl. Cap. 443, 1823; *R. pinnatus*, Harv., Fl. Cap. i. p. 6; non Poir ? (Poiret gives the type locality of his *R. pinnatus* as "Les Indes.")**

SOUTH AFRICA. Transvaal: common in vleis and damp grassy places; Pretoria Distr., Aapjes Riv., Oct. 1841, *Burke* s. n. ! in herb. Kew, *Burt-Davy* 824, *Leendertz* 980 !, Lydenburg, *Wilms* 5 !; Ermelo, *Burt-Davy* 17,438 !; Waterberg Distr., Potgietersrust, *Leendertz* 1420 !; Pietersburg Distr., The Downs, *Rogers* 21888 !; Vereeniging, *W. Leslie* in *Trans. Mus. Herb.* 5685. Orange Free State !, Natal !, south to the Eastern Cape Province, and west to Cape Town.

TROPICAL AFRICA. Angola, S. Rhodesia, north to Abyssinia, Fernando Po, Madagascar.

The expressed juice, when fresh, was in the early days of the South African Dutch Colonists recommended for application in cancerous ulcers, whence the vernacular name "Kankerbladen."

var. *glabrescens*, *Burt-Davy*; *R. pubescens*, Thun., affinis, sed herba tenuior, sub-glabrescens.

SOUTH AFRICA. Transvaal: Vereeniging Distr.; Burttholm, Uitgevalen 197, *Burt-Davy* 17682 ! (type) in herb. Kew, and 17164 !; Bethal, *Pott* 3665 !

Leaves eaten by cattle in spring and at other times when grass is scarce !

**57. *Ranunculus Drouetii*, Godr. ex F. Schultz, Arch. Fl. de Fr. et Allem., 10, 1842-54. (*R. aquatilis*, var. *Drouetii*, Hook. f., *R. rigidus*, Godr. non Poir.).**

SOUTH AFRICA. Transvaal: still pools of the Vaal River; Ermelo Distr., *Burt-Davy* 1875 !, Standerton *Pott* 3973 !, Vereeniging *Pott* 3892 !, Bloemhof (?) *Nelson* 218 !, Mooi River at



Potchefstroom Trout Hatchery, *Burt-Davy* ! Orange Free State : Boshof Distr., Vaal River at Smitskraal, *Burt-Davy* 10903 !

Valued for harbouring fish food in trout streams !

**58. *Knowltonia transvaalensis*, Szyszl., Polypet. Rehm. p. 99. (1887).**

SOUTH AFRICA. Transvaal : Pietersburg Distr. ; Houtbosch, *Rehmann* 6402 ! (*type*), *Jenkins* in *Trans. Mus. Herb.* s. n. ! ; Barberton Distr., Saddleback Range, Barberton, grassy mountain sides, 1200–1500 m., abundant, flowering Sept.-Nov. 1889, *Galpin* 460 !

**59. *Knowltonia multiflora*, Burt-Davy, sp. nov. ; *K. transvaalensi* affinis sed foliorum pinnis integris vel irregulariter et leviter lobatis 7–9 cm. longis, 4–6 cm. latis, scapo multi-(12–15) flora ; petalis minoribus 12 mm. longis differt.**

SOUTH AFRICA. Transvaal : Lydenburg Distr., Mac-a-Mac, 1525 m. *C. Mudd* s.n. in herb. *Kew* (*type*). A very scrappy specimen in herb. *Kew*, collected by *Atherstone* near Lydenburg, Dec. 1873–June 1874, s.n., labelled "*K. gracilis*, DC. ?," and a specimen from Sabie Falls, south end of gorge, in sandy loam, *Burt-Davy* 1547 probably belong here.

**60. *Knowltonia canescens*, Szyszl. var *Pottiana*, Burt-Davy, var. nov. a typo foliorum segmentis sub-glabrescentibus et marginibus integris, petiolis longioribus (7–11 cm. longis) et scapis pubescentibus nec canescentibus, differt.**

SOUTH AFRICA. Transvaal : Lydenburg Distr. ; Dullstroom, *F. Noomè* in *Trans. Mus. Herb.* 20803 ! (*type*).

## XLV.—MISCELLANEOUS NOTES.

MR. M. PARK, A.R.C.S., has been appointed by the Secretary of State for the Colonies, on the recommendation of Kew, Assistant Mycologist in the Department of Agriculture, Ceylon.

MR. P. R. DUPONT, Curator of the Botanic Station, Seychelles, has been appointed by the Secretary of State for the Colonies, on the recommendation of Kew, Assistant Director of Agriculture, Mauritius.

MR. A. W. C. BUDGE, M.M., B.Sc., MR. J. E. GRAY, B.A., CAPTAIN J. O'N. HEWITT, A.R.C.S. (Ireland), and CAPTAIN J. R. MACKIE, B.Sc., have been appointed by the Secretary of State for the Colonies, on the recommendation of Kew, Superintendents in the Agricultural Department, Nigeria.

MR. N. E. BROWN, A.L.S. (*K.B.* 1914, p. 227), has this year been awarded, on the recommendation of Dr. I. B. Pole Evans, and by the unanimous decision of the Council of the South

African Biological Society, the Captain Scott Memorial Medal given for scientific research in South Africa, in recognition of his valuable work on the South African Flora.

The Medal, which was forwarded to the Director with the request that he should make the presentation on behalf of the Council, was handed to Mr. Brown at a meeting of the Herbarium staff which took place on Monday, 7th November, 1921.

**Additions to the Mycological Collection.**—Through the generosity of Dr. W. A. Murrill, of the New York Botanical Garden, the Kew Herbarium has received a very valuable addition. Early this year Miss Wakefield visited New York in order to study there the rich collections of *Polyporaceae* from the American Tropics, with special reference to her own West Indian collections. While there Dr. Murrill suggested that she should select for the Kew Herbarium portions of the type material of species described by him. This was done, and there are now incorporated in the Kew collections co-types or authentic material of over 200 species previously unrepresented there.

The collection is especially valuable because in recent years a considerable amount of work has been done in the United States on the fungi of the American Tropics, very little of which is represented at Kew. A few years ago Dr. F. L. Stevens presented a set of Porto Rican fungi, chiefly *Meliolas*, and various odd specimens have been acquired by exchange or gift. Dr. Murrill's gift is a further most important contribution towards remedying the deficiency in this respect.

Recently a further noteworthy addition to the fungus herbarium has been made by the purchase of a complete set of Dr. Petrak's *Fungi polonici*, *Mycotheca carpatica*, and *Fungi albani et bosniaci*. The set comprises in all 1050 specimens, chiefly micro-fungi, and many of them new, from countries which have been little explored mycologically. E. M. W.

**Presentations to Museums.**—The following miscellaneous specimens have been received in addition to those previously recorded in the *Bulletin* :—

Lady Hooker, Bath.—Walking stick made from a section of an Oak Pile from Old Kew Bridge.

Lady Mary Lockyer, Penywern Road, London.—Pastel portrait of Miss M. H. Mason whose collection of water-colour drawings of the vegetation of South and East Africa, presented to the Royal Gardens, is exhibited in Museum No. IV.

Mr. James Mowatt, Grayshott, Hants.—Photograph and section of an old Crab-apple tree that marked the boundary between Surrey and Hants.

Mr. W. J. Marlow, Hampton Court Gardens.—Sections of abnormal growths of Common Lime with Mistletoe attached.

Messrs. F. H. Ayres, Ltd., Aldersgate Street, London.—A collection of sports requisites in various stages of manufacture.

Mr. A. P. Payne, per Mr. A. E. Bernays, Priory Road, Kew.—Tray made of the wood of Queensland Silky Oak (*Grevillea robusta*).

Lt.-Col. L. Bickle, Sydney, N. S. Wales.—Samples of flour and biscuit made from Prickly Pear (*Opuntia* sp.).

Curator, Botanic Garden, Dominica.—Twelve photographs of the Dominica Botanic Gardens.

The British North Borneo Co., London.—Seeds and fatty oil of *Aleurites triloba*, also samples of Indigo, Jute, Manila, Hemp, etc., from the International Rubber Exhibition.

Mr. H. F. Macmillan, Ceylon Court, Inter. Rubber Exhibition.—Trunks of *Hevea brasiliensis* to illustrate methods of tapping, samples of smoked and unsmoked rubber.

Netherlands Colonies Court, Inter. Rubber Exhibition.—Trunk of *Hevea brasiliensis* to illustrate method of tapping in Sumatra.

Messrs. Harrisons & Crosfield, London.—Pruned tea bush, smoked sheet rubber and four rubber stumps.

Gold Coast Court, Inter. Rubber Exhibition.—A large and varied collection of vegetable economic products.

Mr. A. Luttrell, Dunster Castle, Somerset.—Planks of Douglas Fir and Brown Oak.

Messrs. W. Le Lacheur & Son, London.—Samples of coffee in husk and cleaned from Costa Rica.

Assistant Curator, Botanic Garden, Dominica.—Samples of rubber from *Hevea brasiliensis*.

Mrs. Louisa S. Harvey, West Kensington.—Portrait in oils of Hewett Cotterel Watson, author of various works on Botany. Born 1804. Died 1881. His herbarium is at Kew.

Mr. L. Oliver, Weston-super-Mare.—Pod of *Cassia Fistula* from Burma.

Mr. H. J. Elwes, F.R.S., Colesborne, Gloucestershire.—Veneers of *Sequoia sempervirens* and Manchurian Ash.

Curator, Botanic Gardens, Brisbane.—Cones of *Araucaria Bidwillii* and *Agathis robusta*.

Hon. Mrs. Evelyn Cecil, Poole, Dorset.—Transverse section and plank of *Cupressus macrocarpa*.

Mr. F. E. Sullivan, Alverstoke, Hants.—Model of a boat, made of Tree-fern stem.

Mr. G. Guillet, Kensington.—Several old engravings of views in the Royal Botanic Gardens, Kew.

Mr. P. Scarborough, Lombard Street, London.—Portion of an old Greenheart Pile, from a wharf at Millwall.

J. M. H.

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**Resinous Exudation from Branches of *Larix occidentalis*.—**Hough in American Timbers vol. x, p. 53, records under *Larix*



*occidentalis* that "A sweetish substance resembling dextrin



in properties, exudes in abundance from wounds in the trunk of this tree, and is gathered and eaten by the Indians." Until recently nothing appears to have been seen of any exudation from the trunk or branches of this species in Great Britain, but during the present year the branches and trunks of young trees, about 10 years old, at Kew, have become encrusted with resin, which in the early stages appears as small, transparent, greyish globules. The exudation has a slightly resinous taste but no sweetness can be detected. Whether the condition is due to the

abnormally fine weather experienced during the past months or whether it will continue will be interesting to watch.

W. D.

**Coffee** (*Coffea arabica* and commerical varieties) in **Guatemala and Costa Rica**.—A Report on a Visit to Guatemala and Costa Rica to Investigate Methods of Cultivation of Coffee and Its Diseases and Pests by Mr. A. D. Le Poer Trench, Senior Coffee Officer, Kenya Colony, has been received at Kew from the Colonial Office. It should prove of value to the planters in East Africa as the author includes useful information on the three much-discussed subjects of pruning, shade and manuring.

Costa Rica and Guatemala Coffee usually occupy a prominent position in the market quotations and in the main the methods explained may accordingly be relied on—though as rightly inferred in the report, no hard and fast rules can be laid down and certain variations may be advisable in accordance with local conditions.

Under pruning, a new system called "Agobiada" is described as becoming very popular in Guatemala where it has been in operation for fifteen years, together with the old "Capping" System (cutting or pinching out the top of the young plant when about 12-15 in. high) common also in Costa Rica. The name "Agobiada" means "bent over" and under the system "no capping or topping is ever done; the trees are left to grow any

height, the stems will bend outwards by the weight of the crop and allow plenty of air and light into the tree." Briefly the chief advantages claimed over capping are. (1) It requires less labour for pruning and handling. (2) The tree is more pliable and easily bent, hence extra facility in gathering the crop; (3) The formation of old wood is avoided, so there is less chance of the dreaded disease *Phthora vastatrix*, d'Herelle, attacking old trunk stems.

It is stated that shade has been found necessary when growing Coffee in Central America, except at high elevations; at 2000 ft. and under, heavy shade is used. "The chief shade-trees used are "Banana," *Inga vera*, Willd.—the tree most in favour—"Madre de Cocoa" or "Madera" (*Gliricidia maculata*, H.B. & K. syn. *Robinia maculata*, H.B. & K.) and *Erythrina costaricensis*, M. Micheli—seen growing at very high elevations and suggested as likely to do well in certain districts of East Africa where a trial of the *Inga vera* and other shade trees is proposed.

In reference to manuring it is stated that "coffee has been grown in the countries mentioned for nearly a century. The soil in which it is cultivated is characterized by its richness in humus, due in part to original forest land, leaf mould from the plants themselves and shade trees; but the need for manuring of some description has been evident. It is usually deep and sometimes stony, in colour almost black when damp and the subsoil is similar to the red forest soils of Kenya." Lime and natural manures are recommended in preference to artificial manures. Only very recently the Director forwarded a memorandum (copy appended with further references to literature) on this subject to a firm in London on behalf of a large Coffee Estate owner in Costa Rica, who had found the matter, owing to the age and condition of the trees on his plantation to be one for urgent consideration.

Particulars of Cultivation, Harvesting, Preparing, Machinery and Diseases are also reported on.

**Manures for Coffee Plantations.**—There appears to be no information available as to the effect over a sufficiently long period, of the application of chemical manures on Coffee, to admit of a favourable opinion or a recommendation for general use being given. Such active artificial manures as Sulphate of Ammonia, Sulphate of Potash, Nitrate of Soda, Superphosphate, etc., are undoubtedly of value for annual crops, where immediate results are desirable and the temporary character of the manure is of secondary consideration; but for Coffee—or any other perennial plant—where a slower and more lasting effect is desirable—a similar value has not been established. It has in fact been stated that "most decidedly the active artificial manures would not be suitable for the coffee tree" (Sir John Lawes, "Manures and Coffee," in Bull. Bot. Dept. Jamaica, March 1897, p. 57)

and much difference of opinion seems to prevail in all coffee growing countries on this point.

The manures, however, that may be safely recommended, are those of an organic character, including prunings, leaves, weeds, coffee-pulp and other refuse obtained in the process of preparation of the bean, farm-yard manure, green-manures, bone, dried blood, oil-seed cake, guano, fish manure, to which may be added the inorganic substances, wood-ashes and lime.

Farm manures and green manures, may not be practicable on all plantations; but in respect of the first, the suggestion of rotting down straw to take its place may be worthy of consideration—this is effected by a process recently discovered as the result of many years' investigation. Humification of the straw is brought about by a fermenting organism; but wet straw alone will not rot down, and some active form of nitrogen to start the process is required—this may be supplied by the urine from stock or by passing sewage through a filter bed made up of straw. At Wainfleet (Lincolnshire) this method has been applied to deal with the sewage from a camp of some 200 men, and further trials are in progress to work out a method of making farmyard manure on a large scale without animals (see "The Present Position of Research in Agriculture," by Sir Daniel Hall, in *Journal of the Royal Society of Arts*, April 1st, 1921, p. 305).

The selection, however, of any of the manures mentioned can only be decided on a knowledge of local conditions and under experiment, especially as regards convenience and cost.

A manure of considerable value may be made by mixing the pulp with bone-meal (in the proportion of about one part bone-meal and twenty parts coffee-pulp) together with any general refuse from the plantation, heaped or buried under protection from sun and rain for several months—after the usual method of preparing manure heaps. When sufficiently decayed it may be dug in round the trees, without injury to the roots if possible, or laid on as a mulch.

The Pulp together with parchment and other refuse from the factory, is of value because of the Nitrogen, Phosphoric acid, Potash and Lime it contains and the Bone-meal for the Phosphoric acid, Lime and Nitrogen contained in it. The percentages of the constituents mentioned in the coffee pulp are considerably higher in fresh material than after exposure to sun and rain for several months, and it is important to conserve them as above described. Any wood-ashes that may be available from burning rubbish on the plantation might be put into the manure heap, to increase the supply of potash. Slaked lime when this is found necessary, (and tropical soils are very often deficient in this respect), might be applied with advantage by distributing it over the whole plantation a few months before applying the mixed or other manures, at the rate of about 15 cwt. per acre or with trees 9 ft. by 9 ft. this would be approximately 3 lb. per tree.



Some guide to the requirements of the coffee trees may be found in the following table, from "Le Café: Dans L'Etat de Saint Paul (Brésil)," by A. Lalière (Paris, 1909) p. 122 :—

The annual requirements of 1,000 coffee plants at different ages, of nitrogen, potash and phosphoric acid—the most important constituents taken up by them from the soil, are—

Age of Tree.	Nitrogen.	Potash.	Phosphoric acid.
	lb.	lb.	lb.
First 4 years - - -	9·87	23·62	2·49
From 5 to 8 years - -	35·7	76·92	19·57
From 9 to 20 years - -	28·87	45·83	15·76
After 20 years (old trees) -	5·09	30·53	9·48

Some further particulars will be found in the following works :—

"Potash: Its Distribution, Commerical Sources and Agricultural Value", by Alfred Smetham, F.I.C., pp. 1-28, reprinted from the Journal of the Royal Lancashire Agric. Soc. for 1915 (Geo. Toulmin & Sons, 127 Fishergate, Preston).

"Le Café: Culture" &c., by Henri Lecomte, "Chimie du Café et du Cafier", pp. 207-224 (Georges Carré et C. Naud 3, Rue Racine, Paris, 1899).

"*Coffea arabica* ; in "The Commerical Products of India", by Sir G. Watt, "Manuring and Manures," pp. 378-380 (John Murray, Albemarle St. London, 1908) with references to other works on the subject.

"Kaffee-Düngungsversuche" in Guatemala, by Gustav Holmrich, pp. 1-20—Reprint from "Tropenpflanzer", Vol. V, No. 12, 1901.

"Versuche über die Verwendung von Kunstdünger in der Kultur des Kaffees," by Gustav Helmrich, p. 1-36—Reprint from "Tropenpflanzer," Beihefte, No. 4, 1908.

"Peat-Moss Litter Manure": with an Analysis of Farm-yard Manure, Kew Bull. No. 8, 1911, pp. 349-351.

"Green Manures", Kew Bull. No. 1, 1914, pp. 21-24.

"Coffee; Its Cultivation and manuring in South India", by R. D. Anstead, Dept. Agric. Mysore, Bull. (General Series) No. 6, 1905.

"Artificial Farm-yard Manure", by H. B. Hutchinson and E. H. Richards, Rothamsted Experimental Station, in Journ. Ministry of Agric. xxviii, August 1921, pp. 398-411.

**Latex Yield from Individual Rubber Trees.**—In the Tropical Agriculturist, vol. lviii, No 2, pp. 81-83 we notice three short accounts of the yeild of latex from individual trees of *Hevea brasiliensis* and also results of tapping experiments. In a field of 61 $\frac{3}{4}$  acres where thinning had taken place until 80 trees per

acre were left at the time of the census in December 1920, the following results were obtained:—

(1) Trees yielding latex into the cups	-	-	1428	28%	of total.
(2) Trees yielding scrap only			2605	50	„ „
(3) Trees not yielding anything	-	-	1078	20	„ „
(4) Trees not tapped (treated for brown bast on all three segments)	-		104	2	„ „

The planter who furnished these figures states that he has been of opinion that on many estates "75% of the crop is obtained from 25% of the trees" and these figures certainly corroborate his views. It would be interesting to know the result of a census taken at a later date, with the object of finding out whether the same individual trees are always bad yielders; but from Mr. Stafford Whitby's results given in the *Annals of Botany* (see *Kew. Bull.* 1920, p. 113), it would be expected to be the case. From a similar census made at the Rubber Experiment Station, Mooply, during November and December 1920 over 1266 trees, the following figures were obtained:—

		% of total.
(1) Trees yielding scrap only	-	19.4
(2) „ „ up to $\frac{1}{2}$ oz. of latex	-	29.6
(3) „ „ from $\frac{1}{2}$ to 1 oz. of latex	-	26.8
(4) „ „ „ 1 to 2 ozs.	„	17.9
(5) „ „ „ 2 to 3 ozs.	„	4.1
(6) „ „ „ over 3 ozs.	„	2.2

Such information may be profitably borne in mind when thinning out. In the case of the first set of figures the 2% of trees with brown bast and the 20% not yielding anything might be thinned out straight away, provided none recover enough to be worth the money spent on them. When further thinning became necessary some of the 50% which yield scrap only could be removed. In this case, however, the trees have already been thinned down to 80 to the acre.

The above results emphasise the urgent need which exists for work to be done on seed selection and plant breeding in *Hevea* which it is intended to carry out at the Rubber Experiment Station, Mooply, and elsewhere.

In reference to Tapping Tests and Bast Examination of *Hevea* Plants from selected seed, Mr. C. Heussen records (in *Archief Voor de Rubbercultuur* June 1921), that on the Bijawak Estate a plot was sown in 1915 with seed from the 1914 crop, the offspring of four vigorous and high-yielding mother trees. In September 1918, 100 daughter trees were selected of which 34 were from mother tree No. 1, 20 from No. 2, 23 from No. 3 and 23 from No. 4. Up to September, 1920, five tapping tests,

each of a month's duration were made, three determinations of the number of latex vessels and three of stem girth and bark thickness one meter above ground. The five tapping tests show an increase based on equal areas of 16.8 % over the old plantings. Based on calculations for individual trees those selected gave an increase of 75 %. The offspring show great variation in production. It seems desirable in selecting mother trees, that vegetative vigour should go hand in hand with high production. The results show that "thinning out trees based on the number of latex vessels does not yield satisfactory results" and that a "thinning out on the basis of tapping tests and production measurements is preferable."

Experiments in tapping have already been urged as having an important bearing on the choice of trees to be used for selection (see *Kew. Bull.* 1920, p. 118), and the records made by Dr. De Jong (quoted in the "Trop. Agric." from "Arch. v. Rubbercultuur," June 1921), though not advanced here as conclusive, are of interest as being based on the more up to date methods. Earlier systems of tapping (see *Kew. Bull.* 1898, p. 260: Add. Ses. vii., p. 95: ix., p. 587), including the native Amazon method, spiral, full herring-bone &c. are becoming more or less obsolete. The experiments in question were carried on over a period of more than 7 years on the principle of (1) "One left cut at 1.10 metre high on a quarter of the circumference, tapped twice daily; (2) two left cuts 50 cm. apart on a quarter; two left cuts 50 cm. apart on a quarter; two left cuts 75 cm. apart on a third; and three left cuts 50 cm. apart, all tapped daily, gave almost the same yield. The yield figures for the first 2½ years, both for the trees which remained healthy throughout the experiment and for those which later developed disease ('brown bast') show that there was no difference in the rubber producing ability," and it is further stated that "these tapping systems which use the bark to a height of 1.60 m. have lost fewer trees than the tapping system in which the highest cut was placed at only 1.10 metre."

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**The Journal of the Botanical Society of South Africa.**—We have received Part vii. of the Journal. It is largely concerned with the National Botanic Gardens at Kirstenbosch near Cape Town, probably the most important foundation for the advancement of botany established in recent times. The flora of South Africa is so beautiful and so distinct from any other, especially in regard to its bulbous plants, succulents, heaths, and pelargoniums, that the progress of the new headquarters for its study and elucidation will be watched with sympathetic interest all the world over.

To the Journal Mr. A. R. E. Walker, of the Geological Department of Cape Town University, contributes an article on the geology of Kirstenbosch, very interesting for the informa-



tion it gives of the rocks, soils, streams and contours of the site. Mrs. L. Bolus gives an account of the mammals at Kirstenbosch and an illustrated one of the South African *Proteaceae*—another family which forms one of the most characteristic and conspicuous features of the flora of the South-western districts. It is gratifying to learn from an article by the Curator, Mr. J. W. Mathews, that many of this family are established and thriving in the gardens. Mr. Mathews also gives an account of the principal work in progress at Kirstenbosch from which it is evident that an active policy is being carried out. The formation of a Pelargonium Garden and the restoration of the Silver Tree forest are items of particular interest.

The Director of Kirstenbosch, Prof. R. H. Compton, contributes a suggestive article entitled "The Karroo Garden at Whitehills." In this he points out that, unrivalled as is the site of Kirstenbosch for the purposes of a Botanic Garden in the matters of soil, climate and landscape, neither it nor any other possible site could provide conditions suitable for the successful cultivation of all classes of plants native of South Africa. Amongst those requiring special conditions is the remarkable vegetation of the arid regions known as the Karroo, where grows probably the richest variety of succulent plants in the world. It is regrettable to learn that owing to various causes arising from the operations of mankind, many of these wonderful plants are disappearing. Some probably are already extinct. Owing to the efforts of Prof. Compton, Sir William Hoy (General Manager of Railways), and others, and especially to the generosity of the late Mr. James D. Logan and his family, who presented a piece of land 20 morgen in extent close to the railway at Whitehills, near Matjesfontein, a garden for the preservation and cultivation of Karroo plants is in process of formation. The site is already rich in species growing naturally there and to it, as time and opportunity permit, will be transferred plants from other localities of the Karroo. The area is being fenced round and there is thus provided an opportunity for preserving and studying under natural conditions many species of xerophytic plants in danger of extinction. It is hoped that other similar "sanctuaries" may be established. Horticulturists as well as botanists would be glad to know it had been done for the beautiful "Cape heaths", a family which once filled an important place in ornamental conservatory gardening in the British Isles.

W. J. B.